

CLAIMS

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. An imaging device, comprising:

a die containing an array of imaging elements; and

a transparent element adhesively attached to said die by an adhesive material and having a first surface facing a first surface of said die, at least one of said first surfaces having at least one adhesive flow restriction area for impeding flow of an adhesive across said first surface of said die.
2. The imaging device of claim 1, wherein said adhesive flow restriction area is formed on said first surface of said transparent element.
3. The imaging device of claim 2, wherein said adhesive flow restriction area comprises at least one trench.
4. The imaging device of claim 3, wherein said at least one trench has a rectangular shape.
5. The imaging device of claim 3, wherein said at least one trench has a curved shape.
6. The imaging device of claim 3, wherein said at least one trench creates a perimeter around said array of imaging elements.

7. The imaging device of claim 6, further comprising a second trench creating a perimeter around said at least one trench.

8. The imaging device of claim 3, wherein said at least one trench extends from edge to edge of said transparent element.

9. The imaging device of claim 2, wherein said adhesive flow restriction area comprises at least one protuberance.

10. The imaging device of claim 9, wherein said at least one protuberance has a curved shape.

11. The imaging device of claim 9 wherein said at least one protuberance has a rectangular shape.

12. The imaging device of claim 9, wherein said at least one protuberance has a pointed shape.

13. The imaging device of claim 9, wherein said at least one protuberance is formed of a mesa.

14. The imaging device of claim 9, wherein said at least one protuberance surrounds said array of imaging elements.

15. The imaging device of claim 14, further comprising a second protuberance surrounding said at least one protuberance.

16. The imaging device of claim 9, wherein said at least one protuberance extends from edge to edge of said transparent element.

17. The imaging device of claim 1, wherein said adhesive flow restriction area is formed on said first surface of said die.
18. The imaging device of claim 17, wherein said adhesive flow restriction area is comprises at least one trench.
19. The imaging device of claim 18, wherein said at least one trench has a curved shape.
20. The imaging device of claim 18, wherein said at least one trench creates a perimeter around said array of imaging elements.
21. The imaging device of claim 20, further comprising a second trench creating a perimeter around said at least one trench.
22. The imaging device of claim 18, wherein said at least one trench extends from edge to edge of said die.
23. The imaging device of claim 17, wherein said adhesive flow restriction area comprises at least one protuberance.
24. The imaging device of claim 23, wherein said at least one protuberance has a curved shape.
25. The imaging device of claim 23, wherein said at least one protuberance surrounds said array of imaging elements.
26. The imaging device of claim 25, wherein a second protuberance surrounds said at least one protuberance.

27. The imaging device of claim 23, wherein said at least one protuberance extends from edge to edge of said die.

28. The imaging device of claim 1, wherein said transparent element is comprised of a material selected from the group consisting of glass, an optical thermoplastic material, a polyimide, a thermoset resin, a photosensitive gelatin, and a radiation curable resin.

29. The imaging device of claim 1, wherein said adhesive material at an edge of said transparent element completely covers wire bonds electrically connecting said die to conductive lines.

30. The imaging device of claim 1, wherein said die is associated with a substrate.

31. The imaging device of claim 1, wherein said die is electrically connected to conductive tape by at least one conductive structure.

32. The imaging device of claim 31, wherein said at least one conductive structure is a solder ball.

33. The imaging device of claim 1, wherein said imaging element is comprised of an array of pixels, said pixels providing electrical signals corresponding to a response from light radiation.

34. The imaging device of claim 1, wherein said imaging element is comprised of an array of pixels, said pixels capable of displaying an image corresponding to electrical signals.

35. The imaging device of claim 1, wherein a vacant space between said transparent element and said array of imaging elements is hermetically sealed by said adhesive material.

36. A method of manufacturing an imaging device, said method comprising:

forming a die having a first surface, said first surface containing an array of imaging elements;

forming a transparent element having a first surface;

forming at least one adhesive flow restriction area on at least one of said first surfaces; and

adhesively attaching said transparent element to said die such that said first surface of said transparent element faces said first surface of said die.

37. The method of claim 36, wherein said adhesive flow restriction area is formed on said first surface of said transparent element.

38. The method of claim 37, wherein said act of forming an adhesive flow restriction area comprises forming at least one trench.

39. The method of claim 38, wherein said act of forming at least one trench is performed by reactive ion etching.

40. The method of claim 38, wherein said act of forming at least one trench is performed by mechanical sawing.

41. The method of claim 38, wherein said act of forming at least one trench creates a perimeter around said array of imaging elements.

42. The method of claim 41, further comprising forming a second trench creating a perimeter around said at least one trench.

43. The method of claim 38, wherein said act of forming said at least one trench further comprises forming at least one trench extending from edge to edge of said transparent element.

44. The method of claim 37, wherein said act of forming an adhesive flow restriction comprises forming at least one protuberance.

45. The method of claim 44, wherein said act of forming at least one protuberance is performed such that said protuberance surrounds said imaging elements on said die.

46. The method of claim 45, further comprising the act of forming a second protuberance such that said second protuberance surrounds said at least one protuberance.

47. The method of claim 44, wherein said act of forming at least one protuberance is performed such that said at least one protuberance extends from edge to edge of said transparent element.

48. The method of claim 36, wherein said adhesive flow restriction area is formed on said first surface of said die.

49. The method of claim 48, wherein said act of forming an adhesive flow restriction area on said die comprises forming at least one trench.

50. The method of claim 49, wherein said act of forming at least one trench creates a perimeter around said array of imaging elements.

51. The method of claim 50, further comprising forming a second trench creating a perimeter around said at least one trench.

52. The method of claim 49, wherein said act of forming said at least one trench further comprises forming at least one trench extending from edge to edge of said die.

53. The method of claim 48, wherein said act of forming an adhesive flow restriction comprises forming at least one protuberance.

54. The method of claim 53, wherein said act of forming at least one protuberance is performed such that said at least one protuberance surrounds said imaging elements of said die.

55. The method of claim 54, further comprising the act of forming a second protuberance such that said second protuberance surrounds said at least one protuberance.

56. The method of claim 53, wherein said act of forming at least one protuberance is performed such that said at least one protuberance extends from edge to edge of said die.

57.The method of claim 36, wherein said imaging element is comprised of an array of pixels, said pixels providing electrical signals corresponding to a response from light radiation.

58.The method of claim 36, wherein said imaging element is comprised of an array of pixels, said pixels capable of displaying an image corresponding to electrical signals.

59.The method of claim 36, wherein said act of mounting said transparent element to said die is performed such that a vacant space between said transparent element and said array of pixels is hermetically sealed by said adhesive material.

60.The method of claim 36, further comprising associating said die with a substrate.

61.The method of claim 36, further comprising electrically connecting said die to a conductive tape by at least one conductive structure.

62.The method of claim 61, wherein said at least one conductive structure comprises at least one solder ball.